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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,471	03/29/2004	Chellappa Balan	132749	9761

6147 7590 12/05/2007

GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER	
NGUYEN, ANDREW H	

ART UNIT	PAPER NUMBER
4124	

NOTIFICATION DATE	DELIVERY MODE
12/05/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/810,471	BALAN ET AL.	
	Examiner	Art Unit	
	Andrew Nguyen	4124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/29/2004, 8/12/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5, 6, 8, 9, 13, 15, 20, 21, and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by International publication WO 02/02460 A2 to Deckman et al. (Deckman).

In reference to claim 1:

Deckman teaches:

A system for co-production of hydrogen and electrical energy comprising:

a reformer (3) *configured to receive a reformer fuel and steam* (through feed 1, page 3, last paragraph) *and produce a reformate rich in hydrogen* (page 12 last paragraph – page 13 first paragraph)*;*

a separation unit (4) *in fluid communication with said reformer wherein said separation unit is configured to receive said reformate to separate hydrogen from said reformate and produce an off gas* (page 4 second paragraph)*;*

a combustor (5) *configured to receive a fuel for combustion and produce heat energy and a hot compressed gas* (page 12 2nd paragraph – page 13 1st paragraph)*, wherein said combustor is coupled with said reformer* (Fig 2; 3 and 5, page 12 last paragraph)*; and*

a gas turbine (204) *to expand said hot compressed gas and produce electrical energy and an expanded gas* (page 13 1st paragraph);

wherein at least a part of said heat energy from said combustor is used to produce said reformate in said reformer (Pg 10, last paragraph – pg 11 1st paragraph).

In reference to claim 2:

Deckman teaches:

The system according to claim 1 (see rejection of claim 1 above), *wherein at least a part of said off gas is recycled back to said reformer after separation of hydrogen* (pg 13 1st paragraph).

In reference to claim 5:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above) *further comprising a heat exchanger* (211, pg 13 1st paragraph) *to generate steam.*

In reference to claim 6:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above), *wherein said separation unit further comprises a separating device selected from the group consisting of at least one chemical absorber, pressure swing adsorber, cryogenic separator, membrane separator* (4) *and liquefier.*

In reference to claim 8:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above), *wherein said hydrogen produced from said separation unit is used as said fuel for said combustor* (pg 13 1st paragraph).

In reference to claim 9:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above), *wherein said expanded gas produced from said gas turbine comprises substantially low concentration of carbon dioxide* (pg 12 2nd paragraph).

In reference to claim 13:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above), *wherein said off gas from said separation unit is recycled into said combustor* (pg 13 1st paragraph). The product of the reformer (6) will contain hydrogen. When the product is recycled back to the reformer (via line 219), some of the hydrogen in the recycled gas may be separated into H_2 and fed into the combustor.

In reference to claim 15:

Deckman teaches:

A system for co-production of hydrogen and electrical energy comprising:

a reformer (3) *configured to receive a reformer fuel and steam and produce a reformate rich in hydrogen*

a combustor (5) *configured to receive a fuel for combustion and produce heat energy and a hot compressed gas, wherein said combustor is coupled with said reformer;*

a separation unit (4) *in fluid communication with said reformer wherein said separation unit is configured to receive said reformate to separate hydrogen from said reformate and produce an off gas, wherein at least a part of said heat energy from said combustor is used to produce said reformate in said reformer* (Pg 10, last paragraph – pg 11 1st paragraph);

a gas turbine (204) *to expand said hot compressed gas and produce electrical energy and an expanded gas;*

wherein at least a part of said heat energy from said combustor is used to produce said reformate (Page 10, last paragraph – page 11 1st paragraph) *in said reformer and said separation unit is configured to separate carbon dioxide from said reformate and recycle at least a part of said off gas to said reformer* (pg 13 2nd paragraph).

In reference to claim 20:

Deckman teaches:

A method for co-production of hydrogen and electrical energy comprising the steps of reforming a mixture of a reformer fuel and steam in a reformer and producing a reformate rich in hydrogen (pg 17 2nd paragraph);

separating hydrogen from said reformate and producing an off gas (pg 17 2nd paragraph);

combusting a fuel in a combustor and producing heat energy and a hot compressed gas, wherein said combustor is coupled with said reformer; and expanding said hot compressed gas in a gas turbine expanding and producing electrical energy and an expanded gas (pg 13 1st paragraph);

wherein at least a part of said heat energy from said combustor is used to produce said reformate in said reformer (pg 10, last paragraph – pg 11 1st paragraph)

In reference to claim 21:

Deckman teaches:

The method according to claim 20 (see rejection of claim 20 above), *comprising recycling at least a part of said off gas back to said reformer after separation of hydrogen* (pg 13 2nd paragraph).

In reference to claim 22:

Deckman teaches:

A combustor reformer system comprising: a combustor (5) *configured to receive a fuel and an oxidant for combustion and production of a hot compressed gas and heat energy, and*

a reformer (3) *in intimate contact with said combustor, said reformer configured to receive a reformer fuel and steam and produce a reformate rich in hydrogen ; wherein said reformer is coupled with said combustor and at least a part of said heat energy from said combustor is used to produce said reformate in said reformer* (Pg 10, last paragraph – pg 11 1st paragraph).

Claim Rejections - 35 USC § 103

3. Claims 3, 4, 7, 10, 11, 16, 17, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/02460 A2 to Deckman et al. (Deckman) as applied to claim 1 above, and further in view of US Patent 4,622,275 to Noguchi et al. (Noguchi).

In reference to claim 3:

Deckman teaches:

> *The system according to claim 1* (see rejection for claim 1 above),

Deckman fails to teach:

> *wherein said reformate further comprises carbon monoxide, carbon dioxide and said reformer fuel.*
>
> The reforming reaction taught by Deckman produces carbon dioxide and carbon monoxide (pg 15 2nd paragraph), but Deckman does not teach reformer fuel as a product. Noguchi teaches a fuel cell power plant in which one of the products of the reforming reaction is residual reactive gas which did not react (col 5 lines 29-33 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention that a reformate comprising reformer fuel would be a predictable result of a reforming process, since any non-perfect reformation would leave some residual reactive gas.

In reference to claim 4:

Deckman further teaches:

wherein said separation unit further comprises at least one water gas shift reactor (page 8 2nd paragraph + formula) *to convert carbon monoxide to carbon dioxide to a hydrogen and carbon dioxide rich stream*

In reference to claim 7:

Deckman further teaches:

wherein said separation unit is configured to separate carbon dioxide from said hydrogen and carbon dioxide rich stream (page 17 last paragraph).

In reference to claim 10:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above)

Deckman fails to teach:

further comprises a heat recovery steam generator (HRSG) to generate steam and a steam turbine.

Noguchi teaches a fuel cell power plant that comprises a reformer, gas turbine, waste heat recovery system – read as HRSG- (92), and a steam turbine (116). Noguchi teaches using the heat recovery system in order to recover heat from the exhaust of the gas turbine and increase thermal efficiency (col 2 lines 2-5 and col 4 lines 19-21 of Noguchi). The steam turbine is incorporated in the system to provide additional power output and thermal efficiency (col 9 lines 38-42 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention to add the waste recovery system and steam turbine of

Noguchi to Deckman's system in order to recover heat from the gas turbine exhaust, increase thermal efficiency, and increase power output.

In reference to claim 11:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above)

Deckman fails to teach:

wherein said hydrogen from said separation unit is used to operate a fuel cell system comprising one or more fuel cells to generate electrical energy.

Noguchi teaches a fuel cell power plant that comprises a reformer and a fuel cell. A reformed gas including hydrogen is delivered from the reformer to the fuel cell. The fuel cell uses the hydrogen to create electric current (col 5 lines 24-28 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention to add the fuel cell of Noguchi to Deckman's system in order to produce electric current.

In reference to claim 16:

Deckman teaches:

The system according to claim 15 (see rejection for claim 1 above),

Deckman fails to teach:

wherein said reformate further comprises carbon monoxide, carbon dioxide and said reformer fuel.

The reforming reaction taught by Deckman produces carbon dioxide and carbon monoxide (pg 15 2nd paragraph), but Deckman does not teach reformer fuel as a

product. Noguchi teaches a fuel cell power plant in which one of the products of the reforming reaction is residual reactive gas which did not react (col 5 lines 29-33 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention that a reformate comprising reformer fuel would be a predictable result of a reforming process, since any non-perfect reformation would leave some residual reactive gas.

In reference to claim 17:

Deckman further teaches:

wherein said separation unit further comprises at least one water gas shift reactor to convert carbon monoxide to carbon dioxide to a hydrogen and carbon dioxide rich stream (pg 8 2nd paragraph in Deckman).

In reference to claim 18:

Deckman further teaches:

wherein said separation unit further comprises a separating device selected from the group consisting of at least one chemical absorber, pressure swing adsorber, cryogenic separator, membrane separator (4 in Deckman) *and liquefier*

In reference to claim 19:

Deckman further teaches:

wherein said separation unit is configured to separate carbon dioxide from said hydrogen and carbon dioxide rich stream (pg 17 2nd paragraph in Deckman).

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/02460 A2 to Deckman et al. (Deckman) as applied to claim 1 above, and further in view of US Patent Application Publication 2004/0031388 A1 to Hsu.

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above)

Deckman fails to teach:

further comprising a hydrogen storage unit

Hsu teaches an energy supply system comprising a reformer and a fuel cell. The reformer outputs a reformed fuel, hydrogen, which can be stored in a fuel storage unit (322, col 7 lines 6-9 of Hsu). It would have been obvious to one of ordinary skill in the art at the time of the invention to add the fuel storage unit of Hsu to the system of Deckman in order to store the hydrogen from the reformer.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/02460 A2 to Deckman et al. (Deckman) as applied to claim 1 above, and further in view of US Patent 5,938,800 to Verrill (Verrill).

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above),

Deckman fails to teach:

wherein said off gas is burned in a secondary combustor

Verrill discloses a reformer that separates hydrogen from an off gas. The hydrogen is used in a fuel cell. The off gases are combusted in a burner – read as combustor- (col 3 lines 42-45 of Verrill). It would have been obvious to one of

ordinary skill in the art at the time of the invention to add the burner of Verrill in the system of Deckman in order to combust the off-gases produced in the reformer as taught by Verrill.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 6,025,403 to Marler discloses a reformer that is in communication with the combustor of a gas turbine. US Patent 3,986,349 to Egan discloses a method of power generation that uses a gas separator. US Patent 4,308,128 to Cummings discloses a process of separating hydrogen for use in a hydrogen plant.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Nguyen whose telephone number is 571-270-5063. The examiner can normally be reached on Monday through Friday 8:30 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Bomberg can be reached on 571-272-4922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AN

CHARLES D. GARBER
SUPERVISORY PATENT EXAMINER